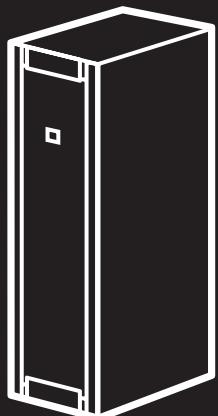




## Smart-UPS® VT

10-30 kVA  
208/220 V

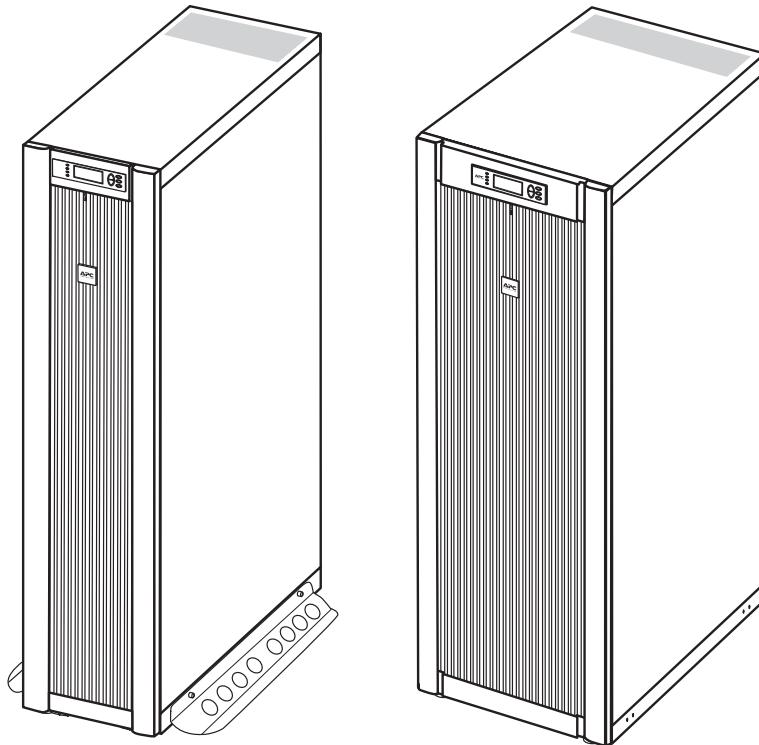
**Site Preparation and  
Installation Manual**





# **Smart-UPS® VT 10-30 kVA 208/220 V**

## **Site Preparation and Installation Manual**



### **IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS**

This manual contains important instructions for the SUVT series that should be followed during installation and maintenance of the UPS and Batteries



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# Safety

## General Safety Instructions

This guide contains important instructions that should be followed when handling the UPS, Battery Enclosures, and batteries.

### Symbols used in this guide



#### WARNING!

Risk of electric shock.



#### CAUTION!

Read this information to avoid equipment damage.



Indicates important information.

Note



Indicates that more information is available on this subject in a different section of this manual.



Indicates that more information is available on the same subject in a different manual.

See also

### Environmental symbols

Temperature	Ventilation requirements	Humidity	Dust/Fumes	Altitude

## General safety

### **WARNING!**



All electrical power and control wiring must be installed by a qualified electrician and comply with local and national codes.

### **WARNING!**



When connected, the UPS contains energy from both AC and DC sources. If the UPS has dual mains supply, be aware of the two AC supply sources. Risk of electric shock - parts inside the UPS are energized from the battery supply even the AC power is disconnected.

### **WARNING!**



Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

### **WARNING!**



Batteries do not contain serviceable parts. Only APC authorized personnel may open batteries.

### **WARNING!**



Do not dispose of battery or batteries in a fire. The battery may explode. Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

### **WARNING!**



Risk of Energy Hazard, 96 V, 7.2 Ampere-hour battery. Before replacing batteries, remove watches, rings, or other metal objects. High energy through conductive materials could cause severe burns.

### **WARNING!**



When handling batteries, wear rubber gloves and boots. Do not lay tools or metal objects on top of batteries.

### **WARNING!**



When replacing a Battery Unit, replace with the same number of the APC SYBT1 (always replace a whole Battery Module (4 Battery Units) at a time).

### **WARNING!**



Only trained personnel familiar with the construction and operation of the equipment and the electrical and mechanical hazards involved, may install and remove system components.



See also

For configurations including customer-supplied external batteries, refer to manufacturer's battery installation and maintenance instructions.

# Introduction

Welcome to the Site Preparation and Installation Manual for the Smart-UPS® VT. This manual contains information on how to prepare your site for the installation of the UPS and optional APC equipment (also available at [www.apc.com](http://www.apc.com)) and instructions on how to carry out the electrical/mechanical installation. Separate manuals are available on:

- Receiving and Unpacking - part no. 990-1747
- Operation - part no. 990-1599



Note

Keep the UPS free from loose objects to prevent obstruction of the airflow.



Note

For more information on APC products and services, visit us at [www.apc.com](http://www.apc.com)

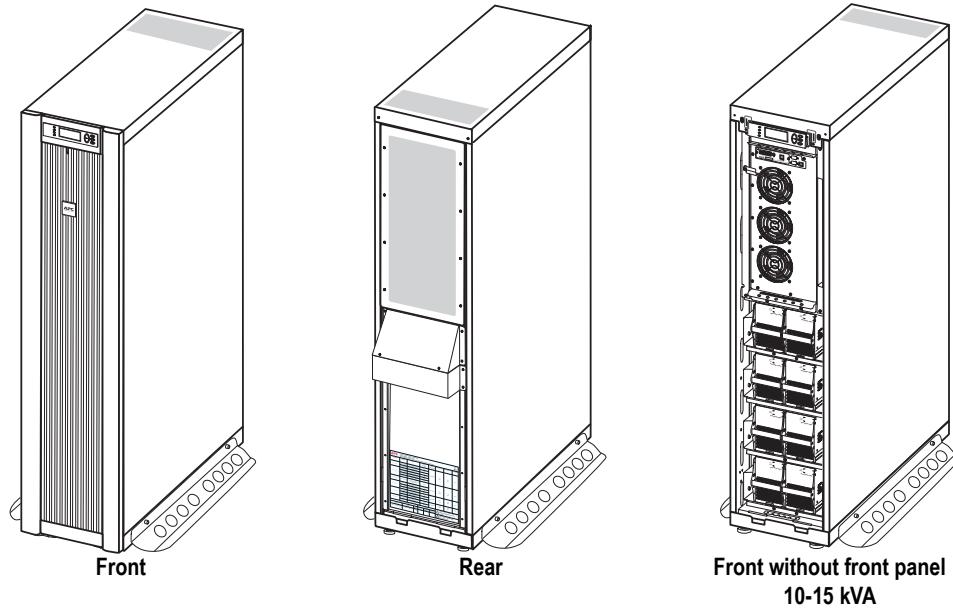


Note

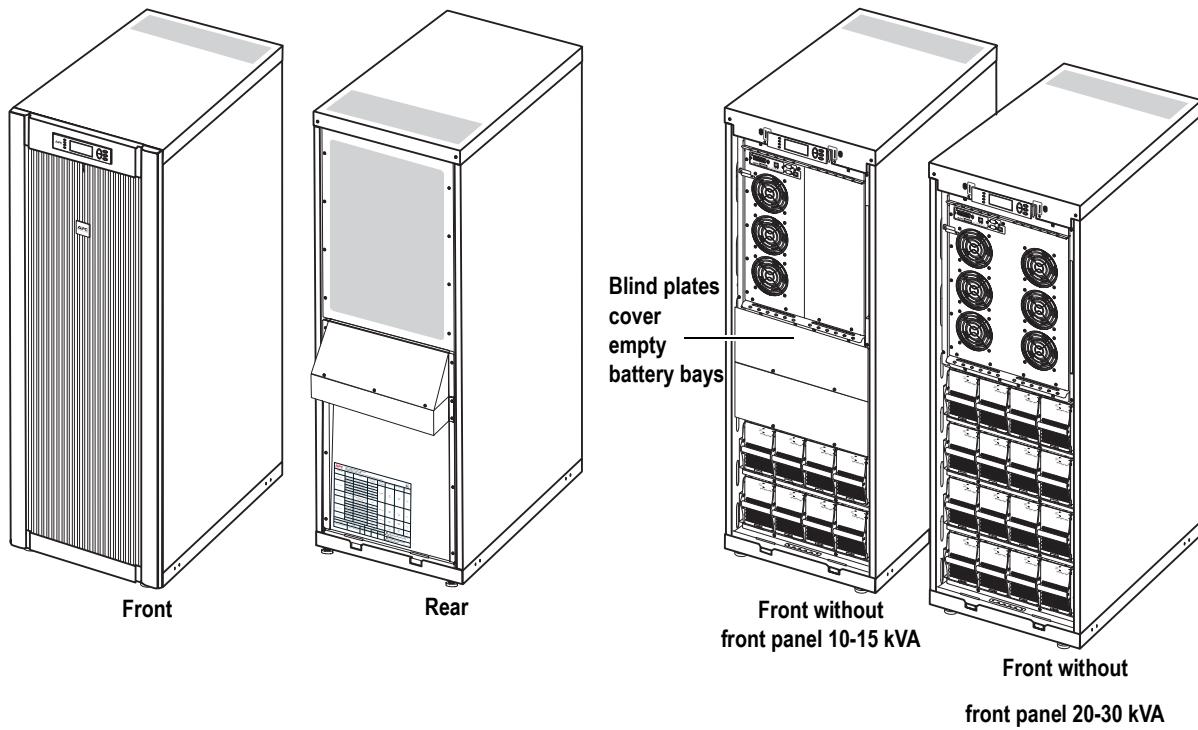
Most illustrations show 20.59 in / 523 mm Enclosures but apply to both Enclosure sizes (13.85 in / 352 mm and 20.59 in / 523 mm). Any differences between the two Enclosure sizes will be addressed in the manual.

# UPS Family Range and Components

## 13.85 in/352 mm Enclosures



## 20.59 in/523 mm Enclosures



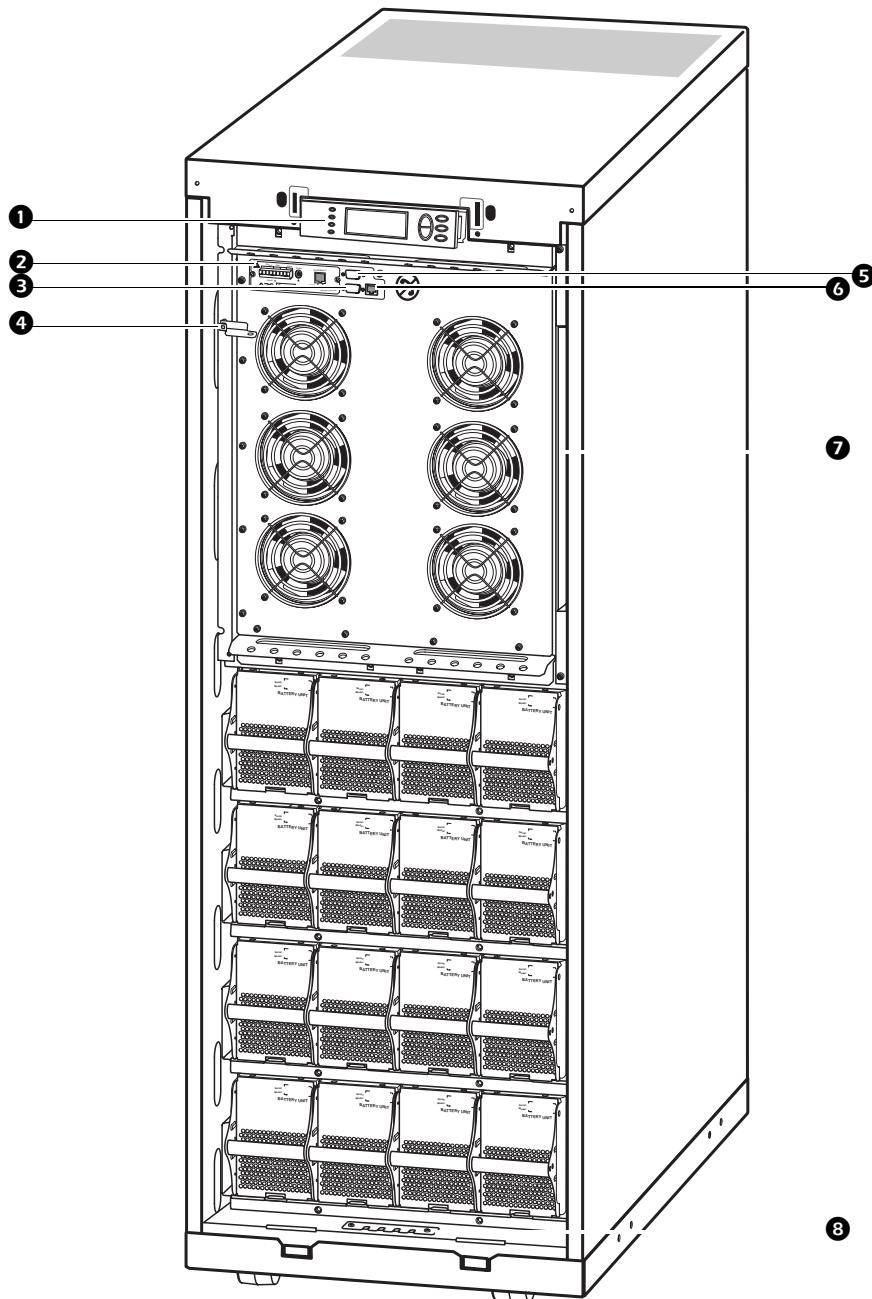
## Serial number

The serial number is available on the type label on the rear side of the UPS.

## Type label

 Hotline in US/Canada/LAM: +1 800 800 4APC Hotline in EMEA: +353 91 70 2000 Worldwide Support numbers: <a href="http://www.apcc.com/support/service/geomap_world.dfm">www.apcc.com/support/service/geomap_world.dfm</a> 										
Unit Serial No	APC SKU	Model		Battery Capacity @± 192V DC	Apparent/ Active Power	Rated Input Current	Rated Output Current	Battery Current		
SUVTF10KB2F	SUVT10KF1B2S	APC Smart-UPS VT 10kVA 208/220V w/1 Batt. Module Exp. to 2		7.2Ah	10kVA/8kW	27.1/25.5A 208/220V	27.8/26.2A 208/220V	28.9A		
	SUVT10KF2B2S	APC Smart-UPS VT 10kVA 208/220V w/2 Batt. Modules		14.4Ah						
SUVTF10KB4F	SUVT10KF1B4S	APC Smart-UPS VT 10kVA 208/220V w/1 Batt. Module Exp. to 4		7.2Ah	15kVA/12kW	40.6/38.4A 208/220V	41.6/39.4A 208/220V	43.3A		
	SUVT10KF2B4S	APC Smart-UPS VT 10kVA 208/220V w/2 Batt. Modules Exp. to 4		14.4Ah						
	SUVT10KF3B4S	APC Smart-UPS VT 10kVA 208/220V w/3 Batt. Modules Exp. to 4		21.6Ah						
	SUVT10KF4B4S	APC Smart-UPS VT 10kVA 208/220V w/4 Batt. Modules		28.8Ah						
SUVTF15KB2F	SUVT15KF2B2S	APC Smart-UPS VT 15kVA 208/220V w/2 Batt. Modules		14.4Ah	20kVA/16kW	54.2/51.2A 208/220V	55.5/52.5A 208/220V	57.7A		
SUVTF15KB4F	SUVT15KF2B4S	APC Smart-UPS VT 15kVA 208/220V w/2 Batt. Modules Exp. to 4		14.4Ah						
	SUVT15KF3B4S	APC Smart-UPS VT 15kVA 208/220V w/3 Batt. Modules Exp. to 4		21.6Ah						
	SUVT15KF4B4S	APC Smart-UPS VT 15kVA 208/220V w/4 Batt. Modules		28.8Ah						
SUVTF20KB4F	SUVT20KF2B4S	APC Smart-UPS VT 20kVA 208/220V w/2 Batt. Modules Exp. to 4		14.4Ah	30kVA/24kW	81.3/76.7A 208/220V	83.3/78.7A 208/220V	86.6A		
	SUVT20KF3B4S	APC Smart-UPS VT 20kVA 208/220V w/3 Batt. Modules Exp. to 4		21.6Ah						
	SUVT20KF4B4S	APC Smart-UPS VT 20kVA 208/220V w/4 Batt. Modules		28.8Ah						
SUVTF30KB4F	SUVT30KF3B4S	APC Smart-UPS VT 30kVA 208/220V w/3 Batt. Modules Exp. to 4		21.6Ah						
	SUVT30KF4B4S	APC Smart-UPS VT 30kVA 208/220V w/4 Batt. Modules		28.8Ah						
Voltage & Connection Types				Batteries		 SEE INSTALLATION INSTRUCTIONS <b>BEFORE CONNECTING TO THE SUPPLY</b>				
AC Input	AC Output	DC Input	Date installed	Date for 1. Replacement	Date for 2. Replacement	 <b>THIS REAR COVER MUST BE PLACED ON UPS</b>				
208Y/120V 4W+GND 60Hz 220Y/127V 4W+GND 60Hz	208Y/120V 4W+GND 60Hz 220Y/127V 4W+GND 60Hz	± 192V				885-2321D_rev05				

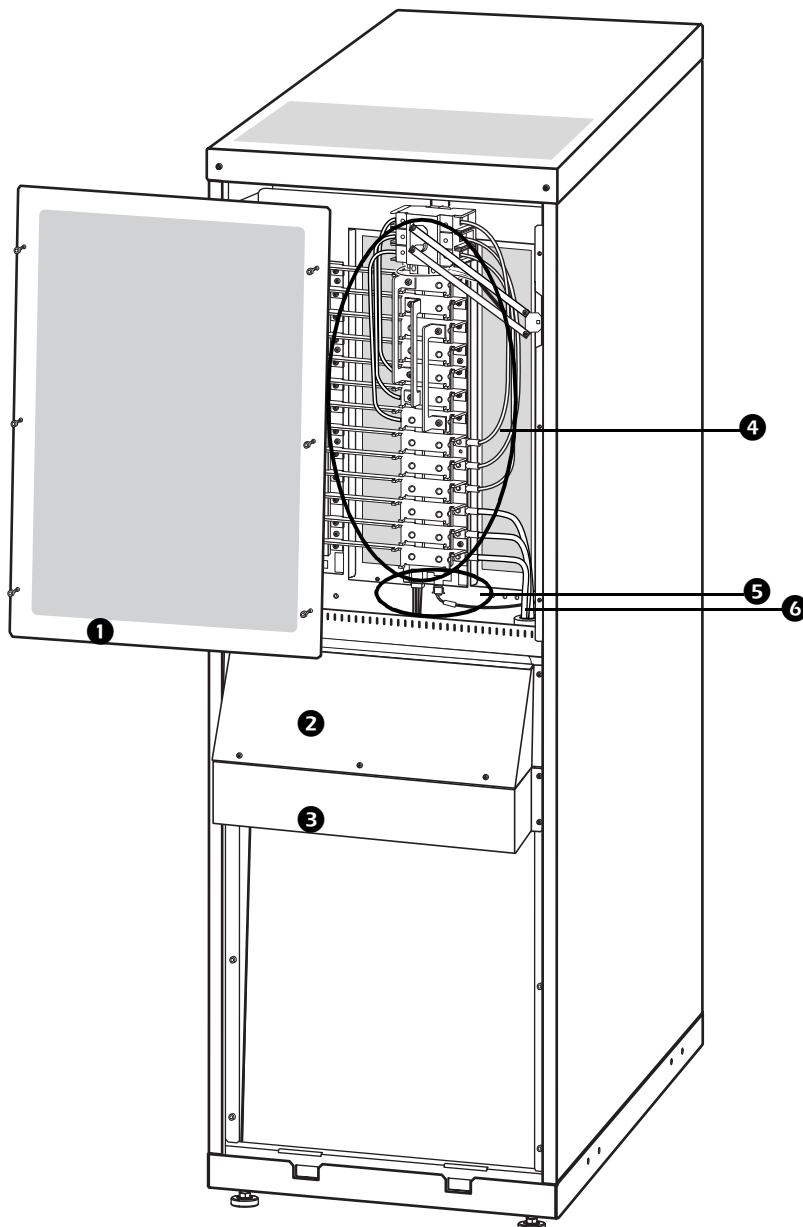
## User interface



- ❶ Display: user-control interface used to configure the functionality, monitor the system, set alarm thresholds, and to provide audible and visual alarms.
- ❷ Network Management Card with Environmental Monitor (AP9619): used for remote system control and monitoring, e-mail notifications etc.
- ❸ Computer-interface port for the connection of computers with APC Powerchute® software.
- ❹ Mechanical Bypass Lever: used to bypass the upstream mains power around the UPS to support the load directly = internal mechanical bypass operation.
- ❺ Service port (for APC maintenance personnel only).

- ❶ Display port for the connection of display communication cable.
- ❷ Documentation storage.
- ❸ Inlet for communication cables.

### **Connection Interface (rear)**

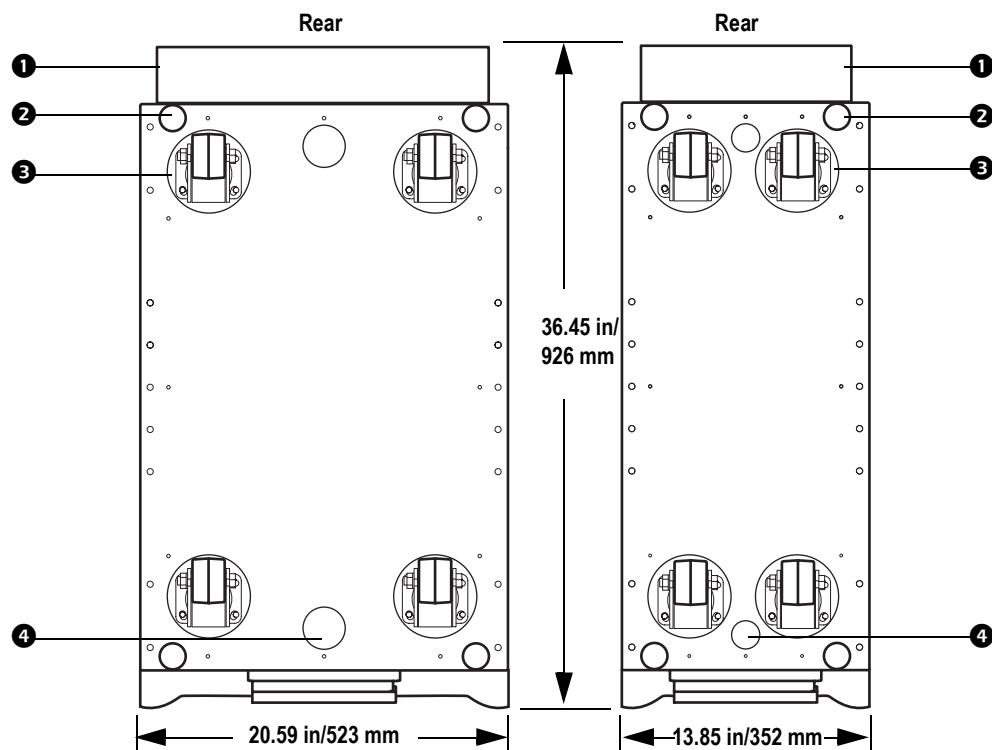


❶ Upper Cover Plate rear.

❷ Upper part of Conduit Box.

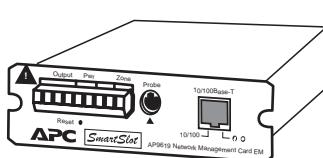
- ③ Lower part of Conduit Box.
- ④ Power connection.
- ⑤ Communication wiring connection (EPO signalling, Battery Temperature Sensor).
- ⑥ Protective earth.

### **Foot print**



- ① Conduit Box.
- ② Levelling feet.
- ③ Castors.
- ④ Communication cable inlets.

**APC Network Management Card AP9619 (installed in UPS) and APC Humidity Sensor (Optional)**



Humidity Sensor



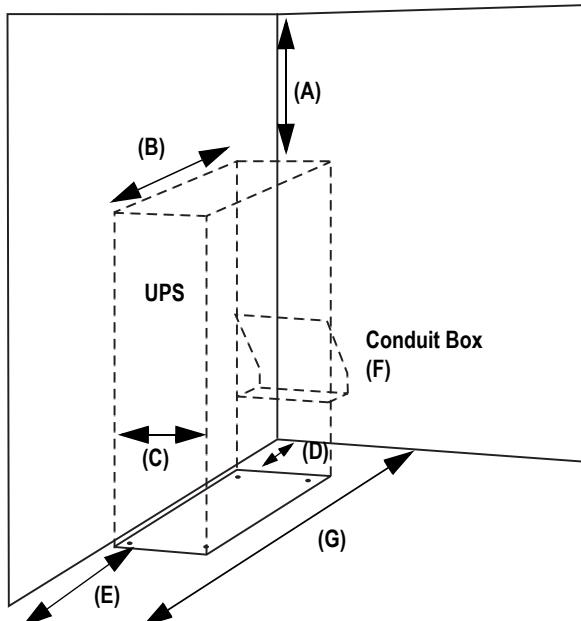
See also

For installing Humidity Sensor see “*Connection of APC Humidity Sensor*” on page 40.

# Site Preparation

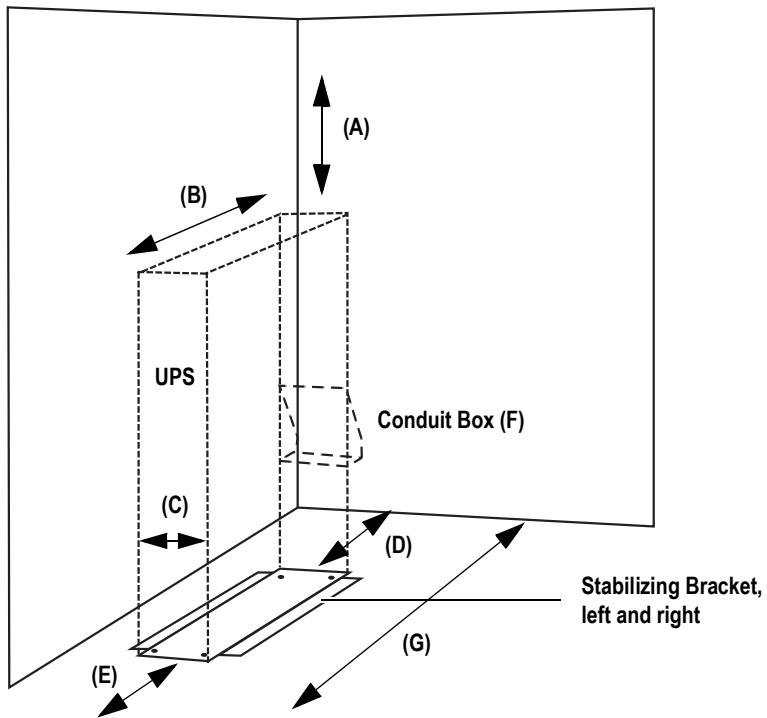
## Installation Space Requirements

### Clearance for 20.59 in/523 mm Enclosures



Space requirements	in	mm
Minimum clearance above Enclosure (A)	20.00	508
Enclosure depth (B)	32.99	838
Enclosure width (C)	20.59	523
Minimum rear service clearance* (compliant with NEC 110.26 for North America) (D)	36.00	914
Minimum front clearance (E)	40.00	1,000
Conduit Box, depth (F)	3.46	88
No side clearance required (add width of Stabilizing Brackets for floor anchoring if applicable)	0	0
Stabilizing Bracket width	3.34	85
Total installation depth, inclusive of Front Panel, Conduit Box and minimum front and rear clearances (G)	112.45	2,840

\* ) Minimum free rear space for ventilation 4 in/100 mm.

**Clearance for stand-alone 13.85 in/352 mm Enclosures**

Space requirements	in	mm
Minimum clearance above UPS (A)	20.00	508
UPS depth (B)	32.99	854
UPS width (C)	13.85	352
Minimum rear service clearance* (compliant with NEC 110.26 for North America) (D)	36.00	914
Minimum front clearance (E)	40.00	1,000
Conduit Box, depth (F)	3.46	88
No side clearance required (add width of Stabilizing Bracket for floor anchoring if applicable)	0	0
Stabilizing Bracket width	3.34	85
Total installation depth, inclusive of Front Panel, Conduit Box and minimum front and rear clearances (G)	112.45	2,840

\*) Minimum free rear space for ventilation 4 in/100 mm.



For the stability of 13.85 in/352 mm stand-alone Enclosures, the Stabilizing Brackets must always be mounted on both sides of the UPS. See Stabilizing Brackets.

# Operating Environment

## Operating conditions



Note

Install the UPS in an indoor, temperature-controlled area, free of conductive contaminants.

Temperature Range: 32° to 104°F / 0° to 40°C	Keep Ventilated Front-to-Rear Airflow (see space considerations)	Relative Humidity: <95% Non-condensing	No Conductive Dust or Corrosive Fumes	Altitude derating table: 3,000 ft/914 m: 100% load 4,500 ft/1371 m: 95% load 6,000 ft/1828 m: 91% load 8,000 ft/2438 m: 86% load 10,000 ft/3048 m: 82% load

## Heat dissipation

UPS size	BTU/hr at fully charged batteries	UPS size	BTU/hr at fully charged batteries
10 kVA	1,774	20 kVA	3,624
15 kVA	2,866	30 kVA	5,486

## Audible noise

UPS Sizes	Audible noise at 100% load (1.09 yard/1 m from the UPS)	Audible noise at <70% load (1.09 yard/1 m from the UPS)
10-15 kVA	54 dBA	45.4 dBA
20-30 kVA	58 dBA	48.5 dBA

## Recommended current protection



**Note**

AC output over-current protection and AC output disconnect must be provided by the customer.

Dual/single mains configuration	Connection	10 kVA	15 kVA	20 kVA	30 kVA	Notes
Single	Mains/bypass input	35 A breaker (30 kAIC)	60 A breaker (30 kAIC)	80 A breaker (30 kAIC)	125 A breaker (30 kAIC)	
Dual	Mains input	35 A breaker (30 kAIC)	60 A breaker (30 kAIC)	80 A breaker (30 kAIC)	125 A breaker (30 kAIC)	1, 2
Dual	Bypass input	35 A breaker (30 kAIC)	60 A breaker (30 kAIC)	80 A breaker (30 kAIC)	125 A breaker (30 kAIC)	1, 2
Any	Output	35 A fast-acting class J fuse	60 A fast-acting class J fuse	80 A fast-acting class J fuse	125 A fast-acting class J fuse	3, 4

**Note 1:** If the available fault current of the installation is below 30 kA, a lower kAIC-rated breaker can be used.

**Note 2:** For breaker settings, refer to below table listing available overload currents.

**Note 3:** If the available fault current of the installation is less than 1200 A for the 10 kVA and 15 kVA UPS sizes, and below 2300 A for the 20 kVA and 30 kVA UPS sizes, a breaker (of the same value as for the bypass input) can be used.

**Note 4:** Recommended maximum rating of a single-fuse configuration if the internal bypass is to be protected during a load short-circuit.

## Minimum breaker settings for 10 kVA UPS

Overload Event	Mains input	Bypass input	Output	Duration	Notes
Internal fault	2 kA	1.7 kA	14 kA	<10 ms	1
800% overload bypass operation	–	223 A	223 A	500 ms	
150% overload normal/battery operation	–	–	42 A	30 s	
125% overload normal/battery operation	–	–	35 A	60 s	
Continuously	34 A	31 A	31 A	∞	

**Note 1:** For the output value, the short-circuit-level is indicated.

**Minimum breaker settings for 15 kVA UPS**

<b>Overload Event</b>	<b>Mains input</b>	<b>Bypass input</b>	<b>Output</b>	<b>Duration</b>	<b>Notes</b>
Internal fault	2.5 kA	2.1 kA	14 kA	<10 ms	1
800% overload bypass operation	–	333 A	333 A	500 ms	
150% overload normal/battery operation	–	–	63 A	30 s	
125% overload normal/battery operation	–	–	52 A	60 s	
Continuously	51 A	46 A	46 A	∞	

**Note 1:** For the output value, the short-circuit-level is indicated

**Minimum breaker settings for 20 kVA UPS**

<b>Overload Event</b>	<b>Mains input</b>	<b>Bypass input</b>	<b>Output</b>	<b>Duration</b>	<b>Notes</b>
Internal fault	4 kA	3.4 kA	14 kA	<10 ms	1
800% overload bypass operation	–	444 A	444 A	500 ms	
150% overload normal/battery operation	–	–	84 A	30 s	
125% overload normal/battery operation	–	–	70 A	60 s	
Continuously	68 A	62 A	62 A	∞	

**Note 1:** For the output value, the short-circuit-level is indicated.

**Minimum setting of breakers for 30 kVA UPS**

<b>Overload Event</b>	<b>Mains input</b>	<b>Bypass input</b>	<b>Output</b>	<b>Duration</b>	<b>Notes</b>
Internal fault	5 kA	4.2 kA	14 kA	<10 ms	1
800% overload bypass operation	–	667 A	667 A	500 ms	
150% overload normal/battery operation	–	–	125 A	30 s	
125% overload normal/battery operation	–	–	105 A	60 s	
Continuously	102 A	92 A	92 A	∞	

**Note 1:** For the output value, the short-circuit level is indicated.

**Recommended phase-conductor sizes [AWG] for a 86°F (30°C) temperature environment**

UPS/AWG sizes	Mains input [AWG]	AC output [AWG]	DC input [AWG], 75°C Wire
10 kVA	8	8	1
15 kVA	6	6	1
20 kVA	4	4	1
30 kVA	1	1	1



**Note**

Use Molex lug type or equivalent, and crimp to manufacturer's specifications.

Cable Size [AWG]	Cable Lug Type	Crimping Tool	Die	Terminal Bolt Diameter
12	YA12CL2TC38	MD7-34R	W12CVT	0.2 in/6 mm
8	YA8CL2TC38	MD7-34R	W8CVT	0.2 in/6 mm
6	YA6CL2TC38	MD7-34R	W5CVT	0.2 in/6 mm
4	YA4CL2TC38	MD7-34R	W4CVT	0.2 in/6 mm
1	YA1CL2TC38	MD7-34R	W1CVT	0.2 in/6 mm



**WARNING!**

At 100% non-linear load (EN50091-3 standard), the neutral shall be rated for 200% phase current.

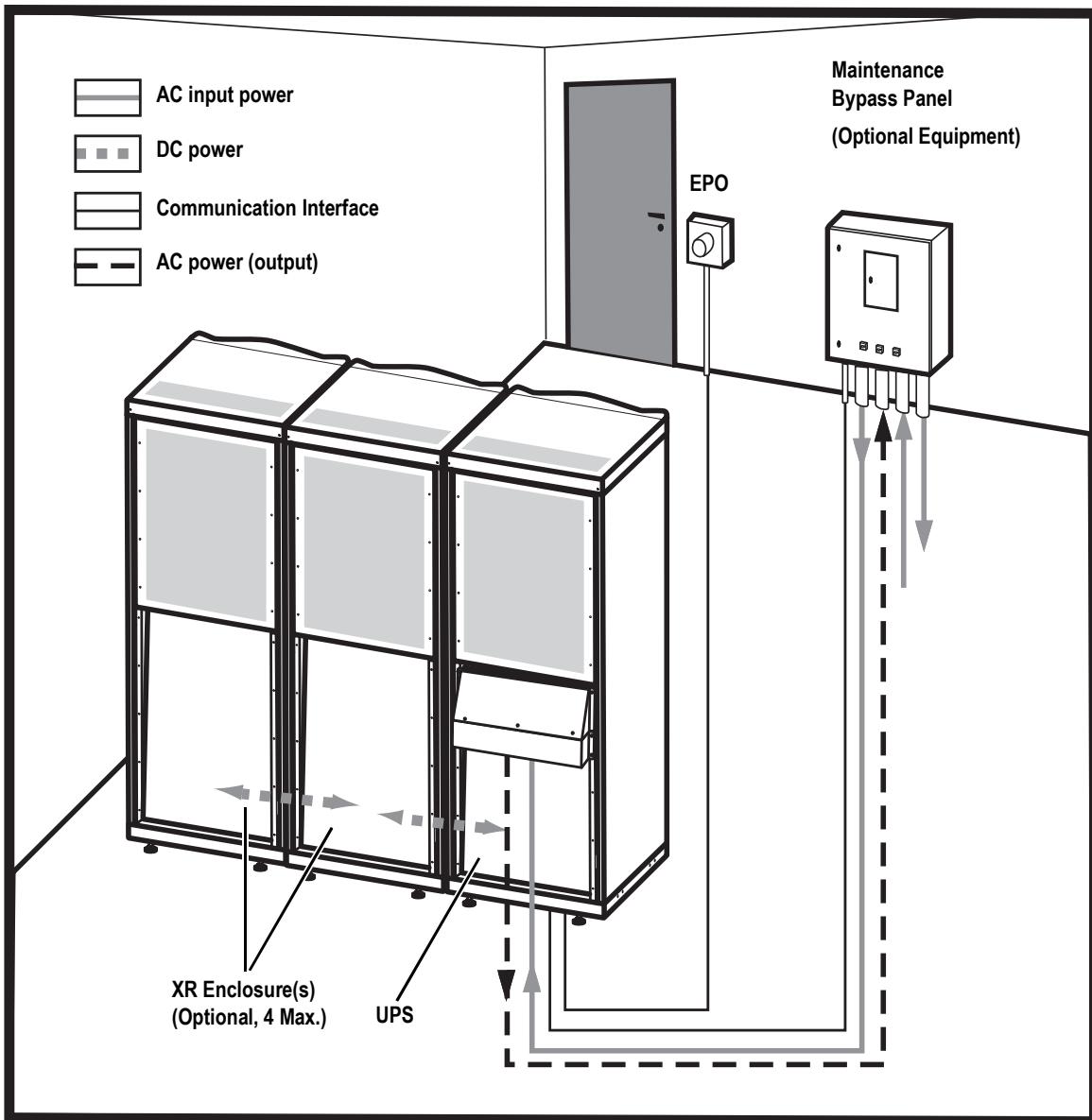
**EPO switch wiring**

The UPS must be connected to either a dry contact or a 24Vdc Emergency Power Off (EPO) switch.



See “Pin connections J108 (for EPO wiring options)” on page 37

# Basic Wiring Overview



# Site Preparation Checklist

---

## **System components. Have you –**

- determined minimum battery run time requirement based on load (kW and kVA) and selected the proper number of APC XR Enclosures (SUVTBXR2B6S, SUVTXR2B6S and SUVTBXR6B6S, SUVTXR6B6S) and Battery Unit (SYBT1). Always install a whole Battery Module (4 Battery Units) at a time.
- considered Service Program or Extended Warranty plan?

## **Site Preparation. Have you –**

- verified that input voltage and current are available?
- considered correct operating space, floor strength (see *Installation Space Requirements*), cooling, and environment (see *Operating Environment*).
- reviewed all electrical work to determine wiring requirements?

## **Arrival Preparation. Have you –**

- verified that space and handling equipment are available to receive the UPS/XR Enclosure? (Including unloading the UPS/XR Enclosure from the delivery truck).
- scheduled an authorized electrician to install the UPS/XR Enclosure?

# Mechanical assembly

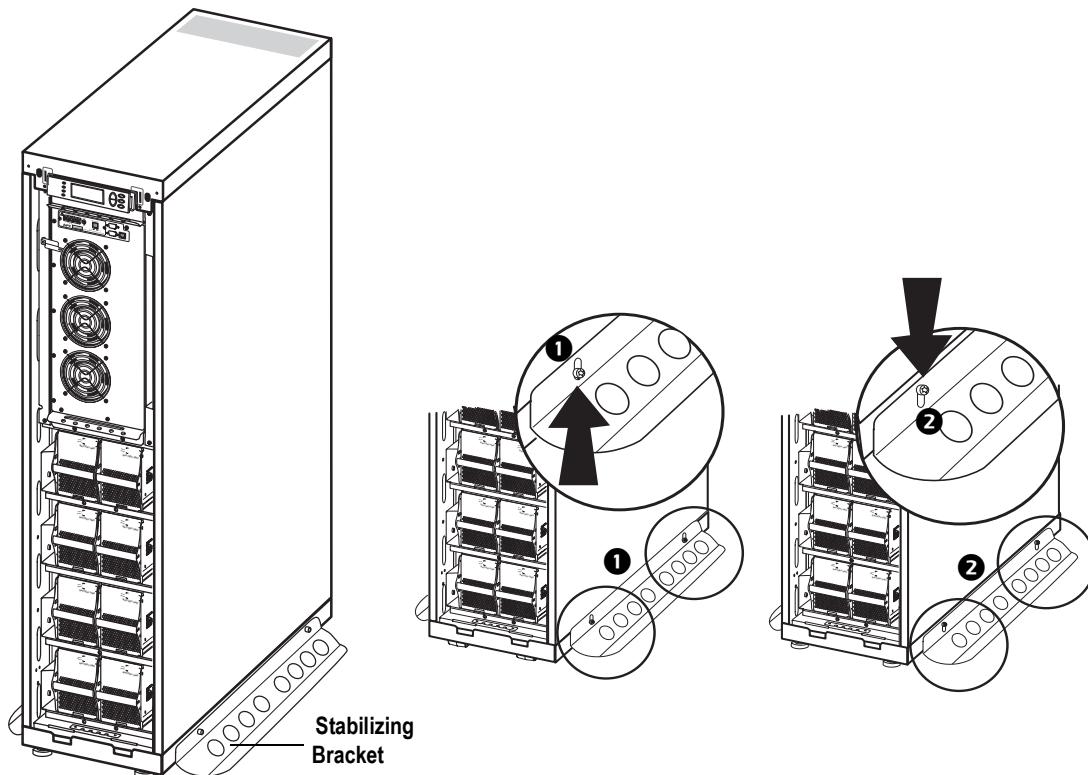
## Stabilizing Brackets

Always install the Stabilizing Brackets on the 13.85 in/352 mm Enclosure (shipped with the UPS) to enhance the stability of the Enclosure.



Note

Attach the Stabilizing Bracket to the UPS Enclosure re-using the screws used to secure the UPS to the pallet during shipment.



If the Enclosure needs to be moved after Stabilizing Brackets have been attached to the Enclosure, the Stabilizing Brackets must be pushed up into their high position.

- ❶ Loosen the two screws of both Stabilizing Brackets, and push the bracket up into the high position.
- ❷ When the Enclosure has reached its new position, push the Bracket into its “down” position again, and tighten the screws.



### WARNING!

For stability reasons, do not remove Stabilizing Brackets from 13.85 in/352 mm Enclosures.

# Leveling Feet

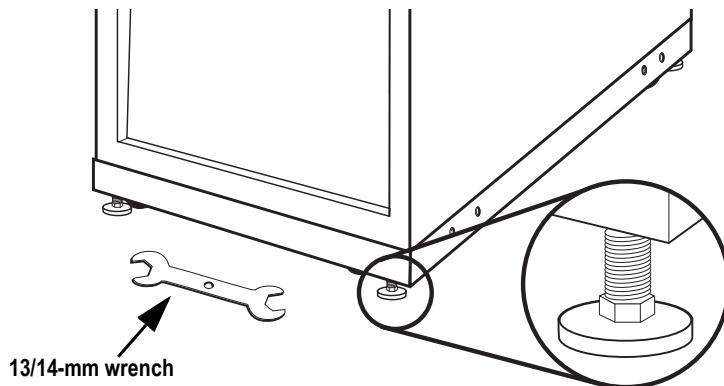


Verify that the installation has been electrically wired before setting the leveling feet.

Note

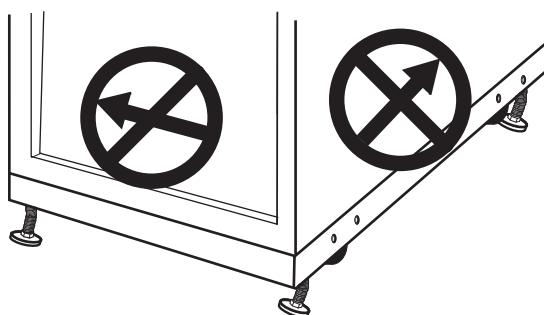
## Setting the leveling feet

Set the leveling feet to ensure the UPS is horizontal when it is in its final operating position. Use a 13/14-mm wrench (shipped with UPS) to adjust all 4 leveling feet from front to back, and left to right, until the pads make solid contact with the floor. Use a bubble level to check the Enclosure is horizontal.



### CAUTION!

To avoid equipment damage, do not push or pull the UPS after the leveling feet have been lowered.



When the Leveling Feet have been set, remember to reinstall the Front Panel.  
See *Front Panel* section.

# Floor Anchoring



Note

If floor anchoring is required in your area, read this section. If not, proceed to *Operating Environment*. However, if you install a 13.85 in/352 mm Enclosure, it must always be equipped with the Stabilizing Bracket for enhanced stability (not necessary to bolt the Stabilizing Bracket to the floor in non-seismic areas).

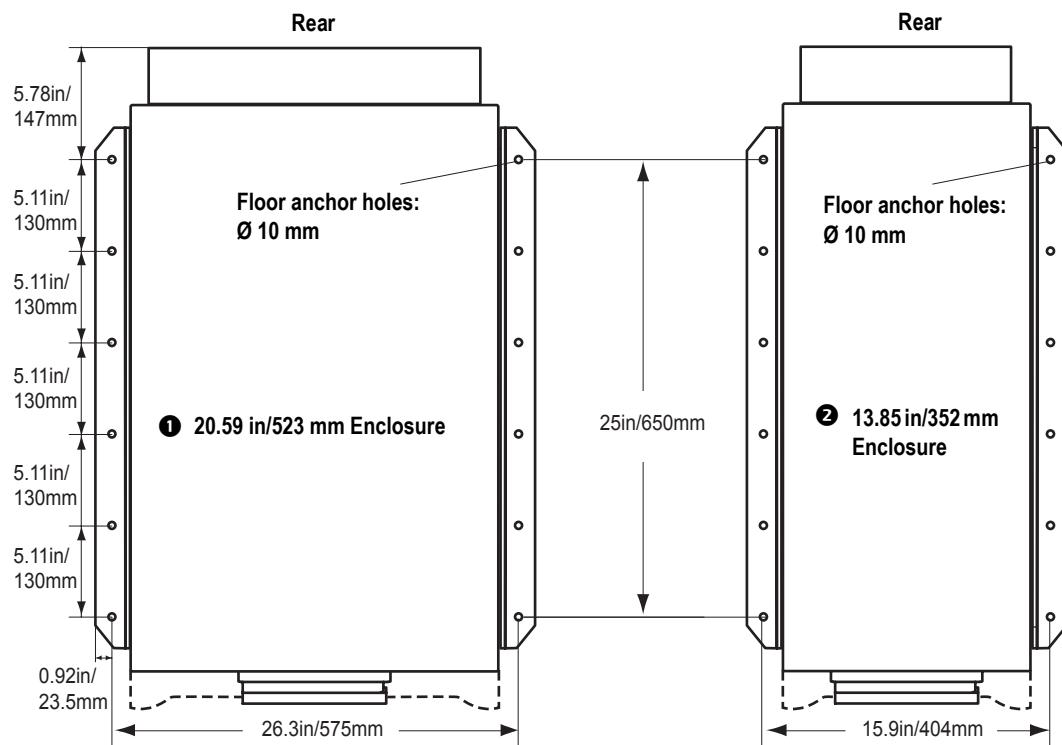
## Drilling floor holes for floor anchoring



Note

If the UPS installation requires floor anchoring, the UPS installation must be anchored to the floor, re-using the brackets that also secured the UPS to the pallets when shipped. For easy determination of where to drill the holes, refer to the applicable drawings below indicating hole positions and size.

## Hole positions for floor anchors (stand-alone Enclosures)



① Refer to this drawing for floor anchor positions for 20.59 in/523 mm.

② Refer to this drawing for 13.85 in/352 mm.

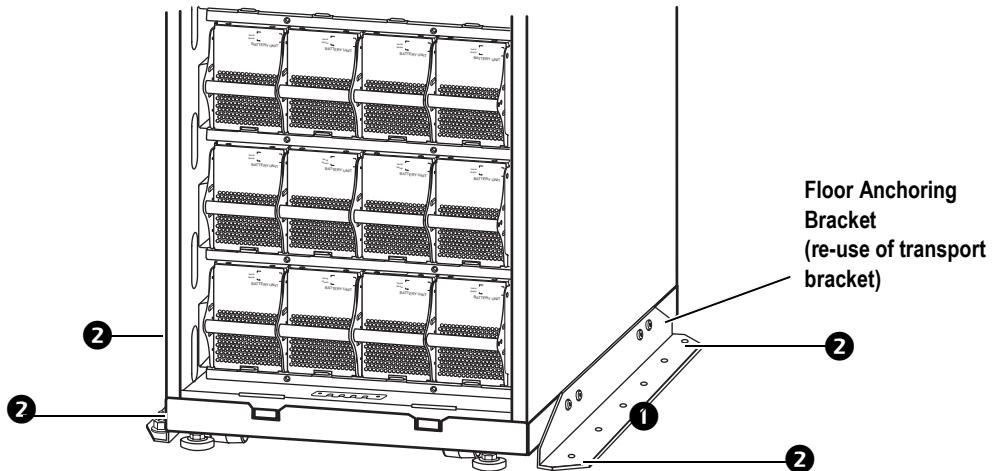


Recommended minimum number of floor bolts per Enclosure: 4 (1 in each corner).  
Recommended floor bolt size: 5/16(3/8) in/8 mm.

### Floor anchoring of stand-alone systems

In seismic areas, it is recommended that the installation be bolted to the floor, and that the batteries be secured in the Enclosure by the Battery Securing Brackets.

- ❶ For floor anchoring, use the 2 transport brackets that were used to secure the UPS to the pallet during transport.



- ❷ Align the 4 holes in the bottom angle of the Floor Anchoring Bracket on either side of the Enclosures to the pre-drilled holes in the floor

# Electrical Installation

## System-Electrical Information

### WARNING!



All electrical power and power control wiring must be installed by a qualified electrician, and must comply with local and national regulations for maximum power rating.

UPS ratings 208 V	10 kVA 8 kW	15 kVA 12 kW	20kVA 16 kW	30 kVA 24 kW
Input voltage / Bypass voltage (V)	3-phase 208Y/ 120 V	3-phase 208Y/ 120 V	3phase 208Y/ 120 V	3-phase 208Y/ 120 V
Input current (nominal, per phase) (A)	24.3	36.5	48.2	72.9
Maximum input current per phase (continuous, at minimum mains voltage)	26.7	40.2	53.0	80.1
Input current protection for mains source or single mains supply (external to UPS, not supplied) (A)	3x35	3x60	3x80	3x125
Input current protection for bypass source in dual mains configuration (external to UPS, not supplied) (A)	35	60	80	125
Input frequency (Hz) range	40-70	40-70	40-70	40-70
Output voltage (on line). (V) Minimum and maximum values (+/- 1%)	120/208	120/208	120/208	120/208
Output current (nominal, per phase) (A)	27.8	41.6	55.5	83.3
Maximum output current (in bypass only at 110% overload per phase)	30.5	45.8	61.1	91.6
Neutral output current (with 100% switch mode load) (A)	48.1	72.1	96.2	144.2
Output current protection (external to UPS, not supplied) (A)	40	60	80	120
Output frequency range (Hz)	50/60	50/60	50/60	50/60
DC overcurrent protection and disconnect switch for external safety: DC voltage rating of the battery supply Maximum available short-circuit current	27.8 +/- 192 10 kA	41.8 +/- 192 10 kA	55.7 +/- 192 10 kA	83.5 +/- 192 10 kA

<b>UPS ratings 220 V</b>	10 kVA 8 kW	15 kVA 12 kW	20kVA 16 kW	30 kVA 24 kW
Input voltage / Bypass voltage (V)	3-phase 220Y/ 127 V	3-phase 220Y/ 127 V	3-phase 220Y/ 127 V	3-phase 220Y/ 127 V
Input current (nominal, per phase) (A)	22.9	34.6	46.5	68.9
Maximum input current per phase (continuous, at minimum mains voltage)	25.2	38.0	50.1	75.8
Input current protection for mains source or single mains supply (external to UPS, not supplied) (A)	3x35	3x60	3x80	3x125
Input current protection for bypass source in dual mains configuration (external to UPS, not supplied) (A)	35	60	80	125
Input frequency (Hz) range	40-70	40-70	40-70	40-70
Output voltage (on line). (V) Minimum and maximum values (+/- 1%)	127/220	127/220	127/220	127/220
Output current (nominal, per phase) (A)	26.2	39.4	52.5	78.7
Maximum output current (in bypass only at 110% overload per phase)	28.9	43.3	57.7	86.6
Neutral output current (with 100% switch mode load) (A)	45.5	68.2	90.9	136.4
Output current protection (external to UPS, not supplied) (A)	40	60	80	120
Output frequency range (Hz)	50/60	50/60	50/60	50/60
DC overcurrent protection and disconnect switch for external safety: DC voltage rating of the battery supply Maximum available short-circuit current	26.4 +/- 192 10 kA	39.6 +/- 192 10 kA	52.7 +/- 192 10 kA	78.9 +/- 192 10 kA

## Source connections



### WARNING!

The UPS must be supplied from a 208Y/120 V or 220Y/127 V 4W + GND 60Hz source.



### CAUTION!

Verify clockwise phase-rotation (L1, L2, L3) and make sure a neutral connection is present.



For recommended “*Recommended current protection*”, see *The Site Preparation* section.



### CAUTION!

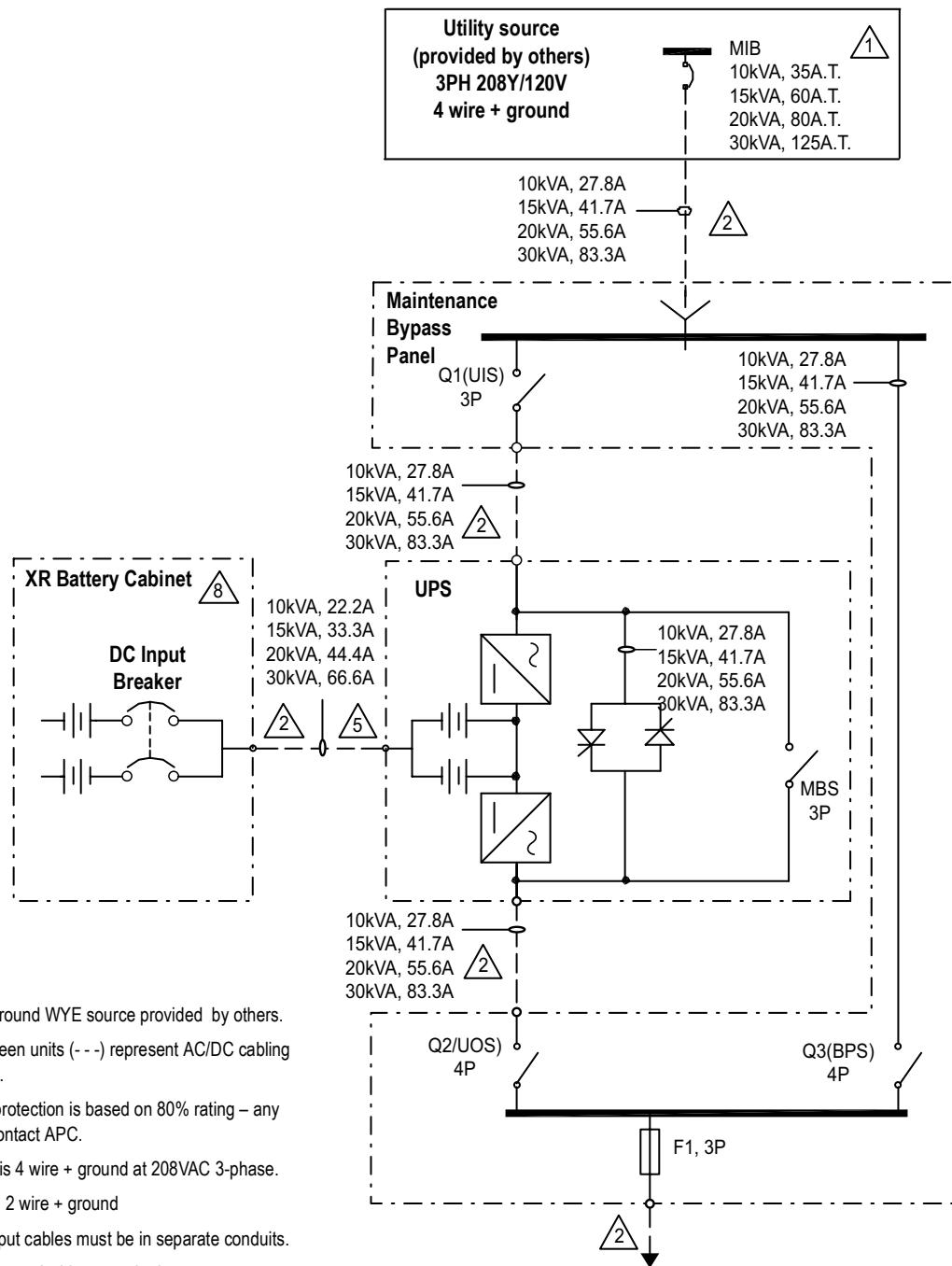
The installation must comply with all local and national codes.



Refer to NEC Articles 310-15, 310-16 for further information.

See also

## One-line diagram for Smart-UPS VT 10, 15, 20, 30kVA, 208V, 3 phase, single mains

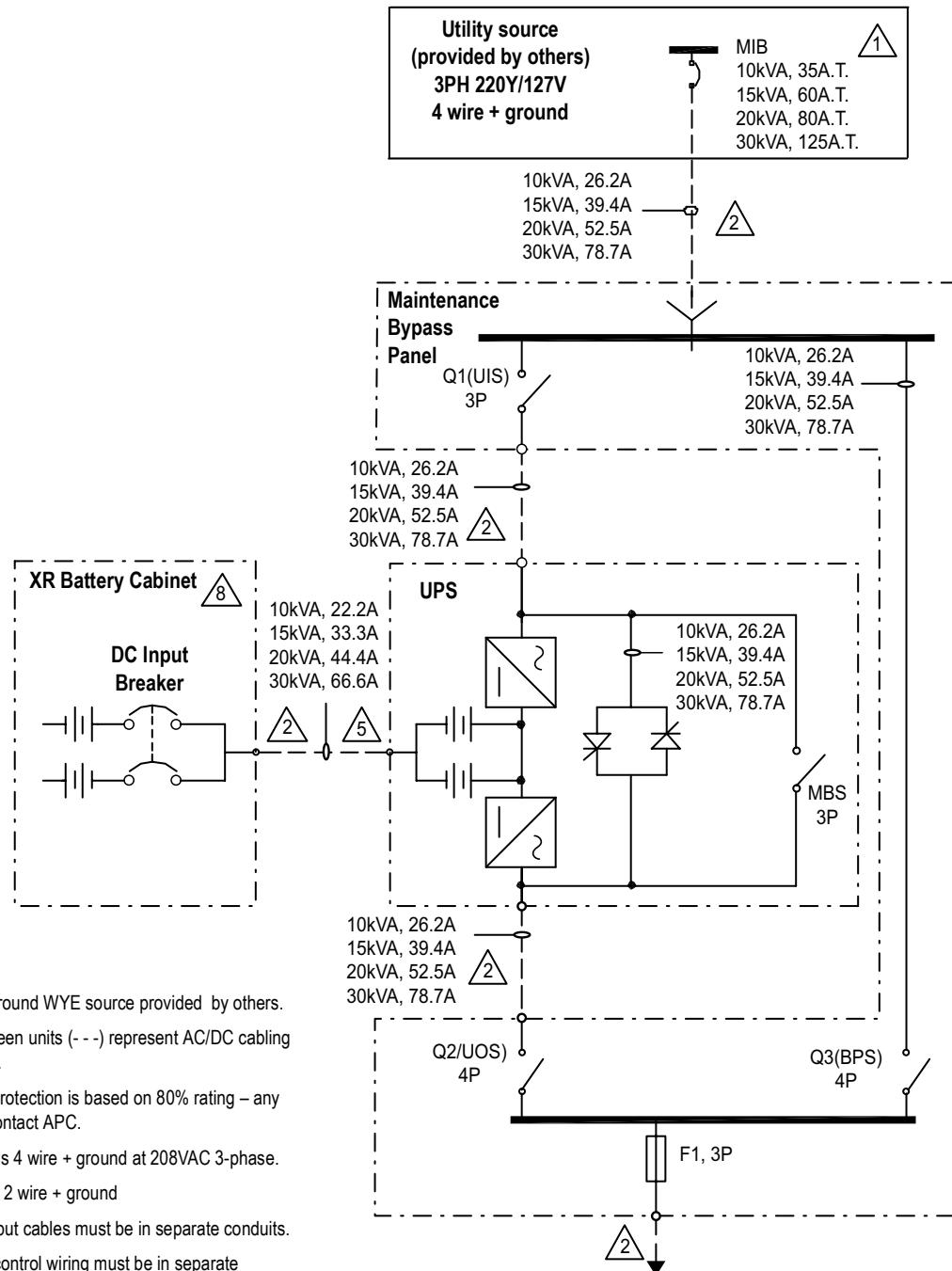

**Notes:**

- △ 1. Must be 4 wire + ground WYE source provided by others.
- △ 2. Dashed lines between units (---) represent AC/DC cabling provided by others.
- 3. Input overcurrent protection is based on 80% rating – any deviation please contact APC.
- 4. AC Power cabling is 4 wire + ground at 208VAC 3-phase.
- △ 5. Separate conduits, 2 wire + ground
- 6. UPS input and output cables must be in separate conduits.
- 7. Power wiring and control wiring must be in separate conduits
- △ 8. XR Battery Enclosure can be bayed to UPS. Baying kit has to be purchased as an option.  
XR Battery Enclosure is available without breaker with DC fuses only. Up to 4 XR Battery Enclosures can be connected to UPS to extend backup time.
- 9. Single mains installation is a default.  
Dual Mains option requires custom engineering. Please refer to APC Custom Engineering group and drawing# CEG-SUVT10KF-SD for details.
- 10. Installation must comply with all applicable national and local codes.

**UPS System Output 10kVA, 15kVA,  
20kVA and 30kVA**

**208V 3ph – 4 wire + ground or  
120V 1ph – 2 wire + ground**

## One-line diagram for Smart-UPS VT 10, 15, 20, 30kVA, 220V, 3 phase, single mains



### Notes:

- △ 1. Must be 4 wire + ground WYE source provided by others.
- △ 2. Dashed lines between units (---) represent AC/DC cabling provided by others.
- 3. Input overcurrent protection is based on 80% rating – any deviation please contact APC.
- 4. AC Power cabling is 4 wire + ground at 208VAC 3-phase.
- △ 5. Separate conduits, 2 wire + ground
- 6. UPS input and output cables must be in separate conduits.
- 7. Power wiring and control wiring must be in separate conduits
- △ 8. XR Battery Enclosure can be bayed to UPS. Baying kit has to be purchased as an option.  
XR Battery Enclosure is available without breaker with DC fuses only. Up to 4 XR Battery Enclosures can be connected to UPS to extend backup time.
- 9. Single mains installation is a default.  
Dual Mains option requires custom engineering. Please refer to APC Custom Engineering group and drawing# CEG-SUVT10kF-SD for details.
- 10. Installation must comply with all applicable national and local codes.

# Wiring

---



Note

Make sure the UPS is in its location of use before wiring begins.



## CAUTION!

Verify clockwise phase-rotation (L1, L2, L3) and make sure a neutral connection is present.



Note

Power terminal lug diameter: minimum 0.2 in/6 mm.

Torque value: 45 lbf-in/7Nm.



Note

If floor anchoring is required, attach the Floor Anchoring Brackets to the UPS now.

Follow step 1 under *Floor Anchoring (Option)*.



Note

Please leave a copy of your wiring diagram with the customer to facilitate maintenance and troubleshooting.

# Input/Output Wiring – Single Mains (default)

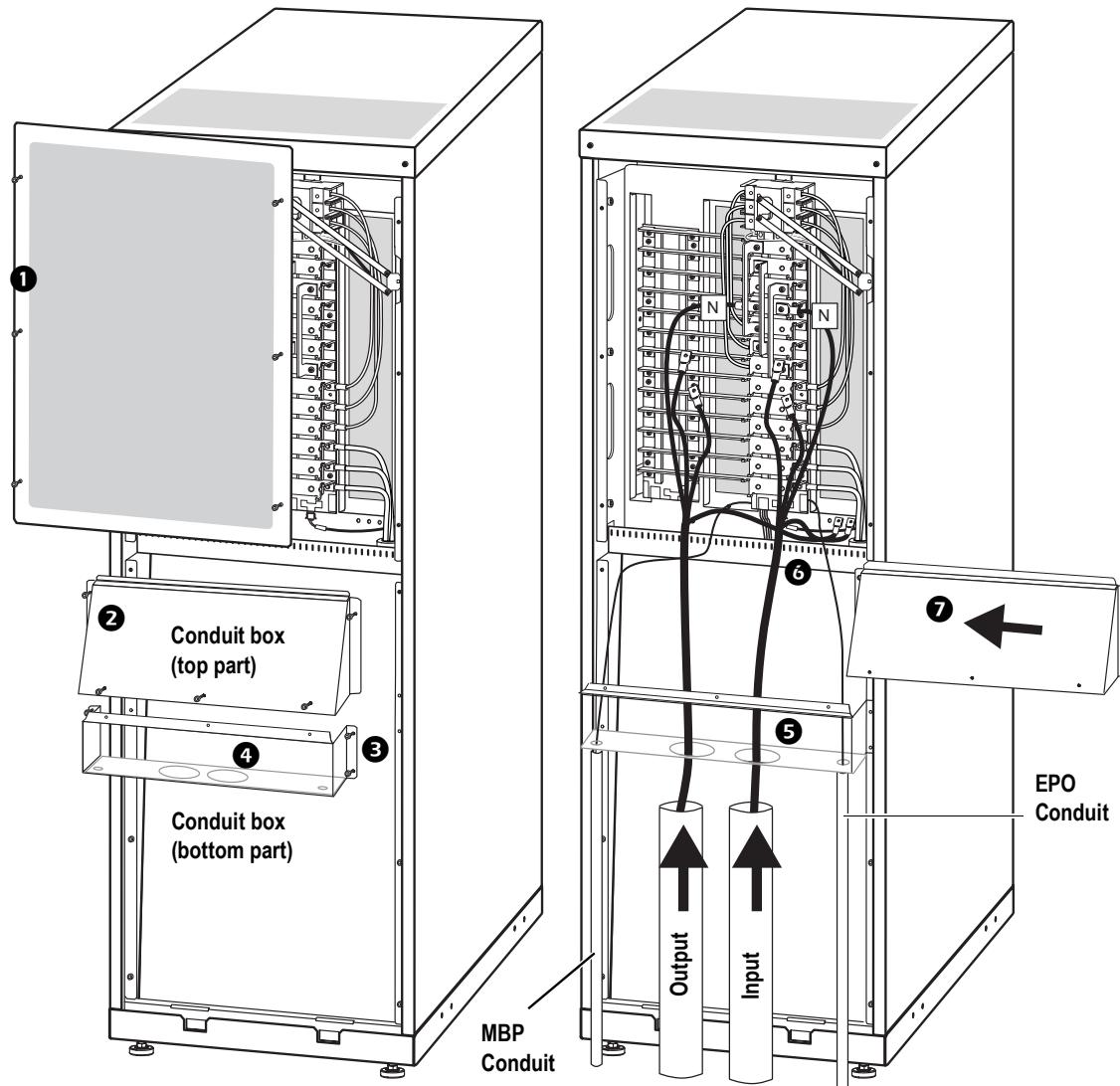
The UPS is designed for both single (default) and dual mains installations. Follow the below steps to install the UPS in a single-mains installation.



The illustrations show a 20.59 in/523 mm Enclosure, but installation procedures are identical for 13.85 in/352 mm Enclosures).

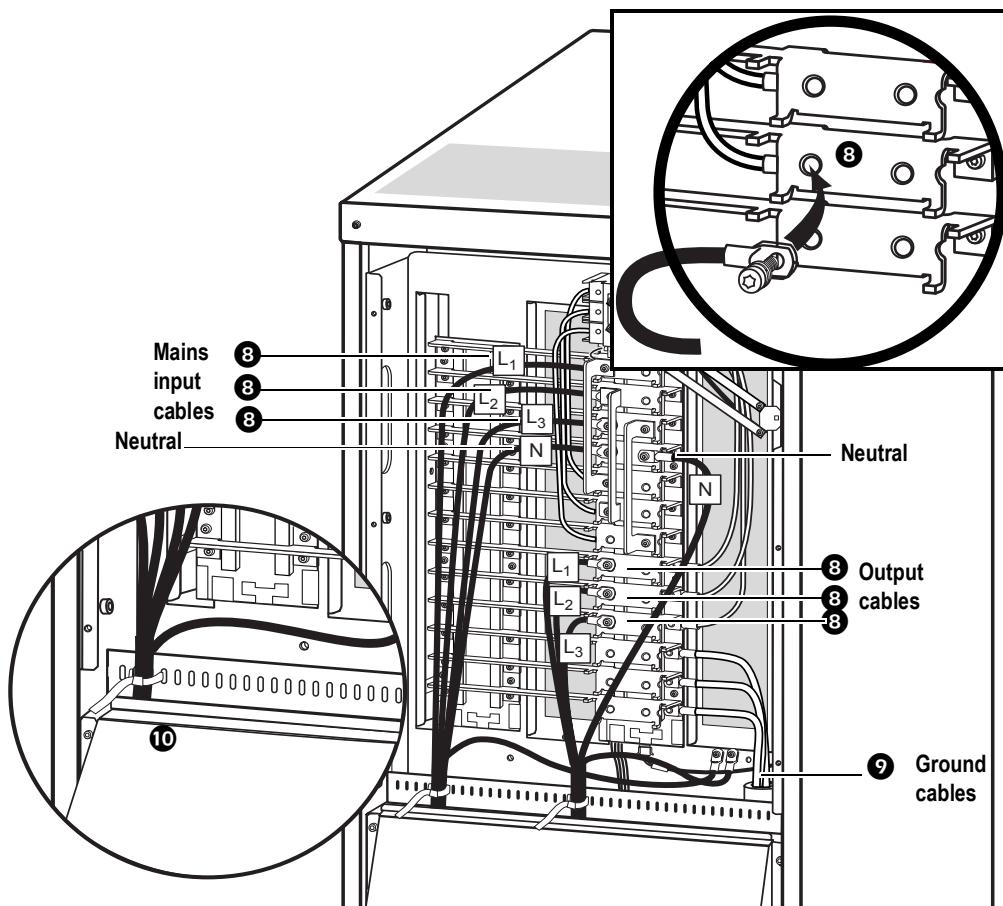
Note

## Wiring procedure – single mains



- ❶ Loosen the (6) M4 screws from the cover of the cable termination area on the rear, and remove.
- ❷ Loosen the (2) M4 screws (1 each side) from the top part of the Conduit Box. Loosen the M4 screws attaching it to the bottom part (2 screws in a 13.8 5in/352 mm Enclosure, 3 screws in a 20.59 in/523 mm Enclosure), and remove.

- ❸ Loosen the (4) M4 screws (2 each side) from the bottom part of the Conduit Box and remove.
- ❹ Punch 2 holes in the marked areas of the Conduit Box bottom to fit the size of the conduit pipes, and reattach the Conduit Box bottom to the Enclosure, re-using the (4) M4 screws.
- ❺ Install conduit pipes in the Conduit Box.
- ❻ Run cables through the conduit pipes and the bottom of the Conduit Box, pull behind the bar and up into the input/output area.
- ❼ Reinstall the top part of the Conduit Box to the Enclosure, following reverse installation procedures.



- ❽ Attach input cable lugs to L1, L2 and L3 input busbars (left side in the UPS – on the front of the busbar), using the provided M6 torx screws. Attach output cable lugs to L1, L2 and L3 output busbars, using the provided M6 torx screws. Attach N x 2 where shown, using the provided torx screws.
- ❾ Attach Ground x 2 where shown, using the provided torx screws.
- ❿ Fasten cables with cable ties.
- ⓫ Reinstall rear cover.

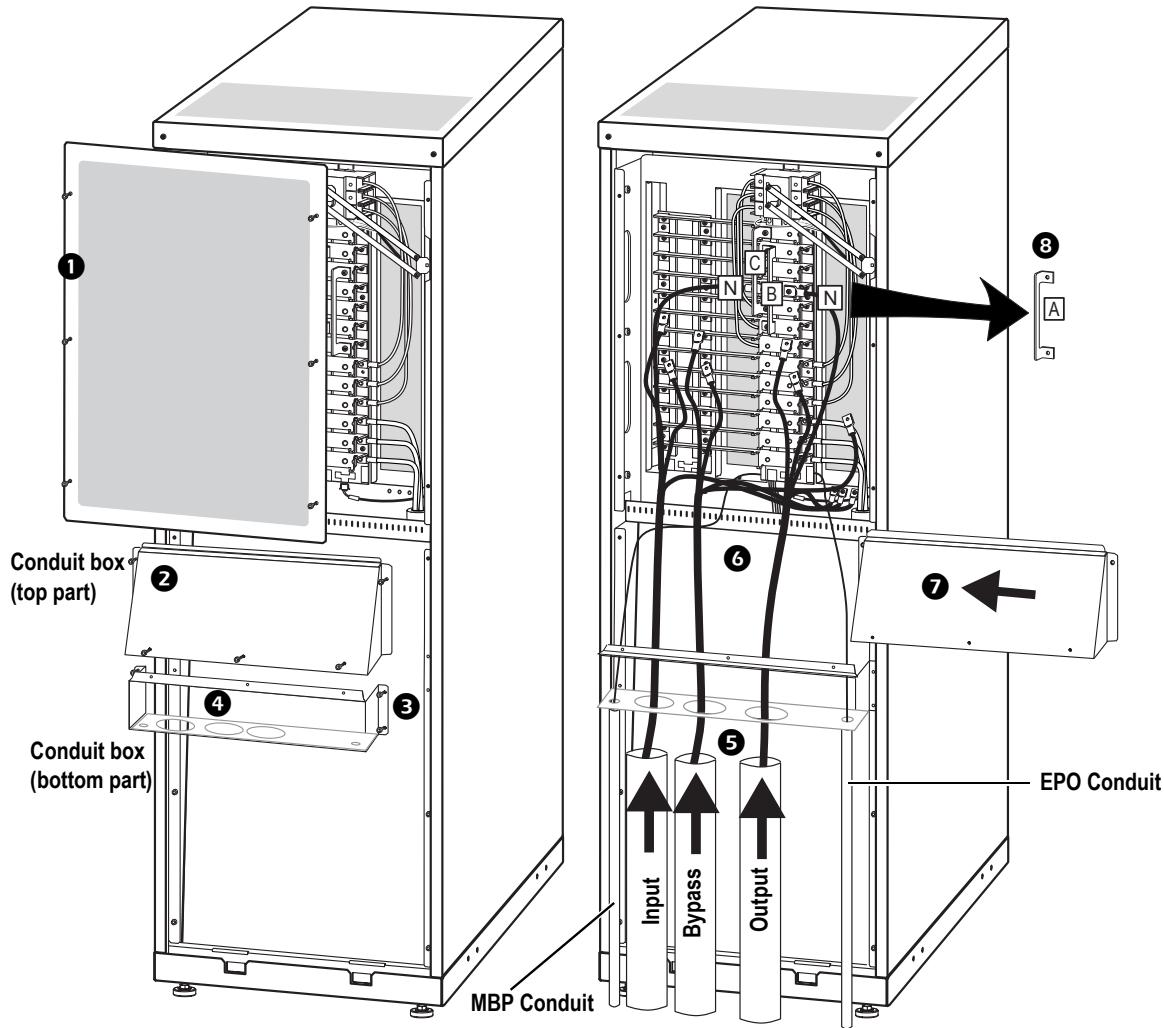
# Input/Output Wiring – Dual Mains

The UPS is designed for single mains installation as default. Follow the below instructions to install the UPS in a dual-mains installation.



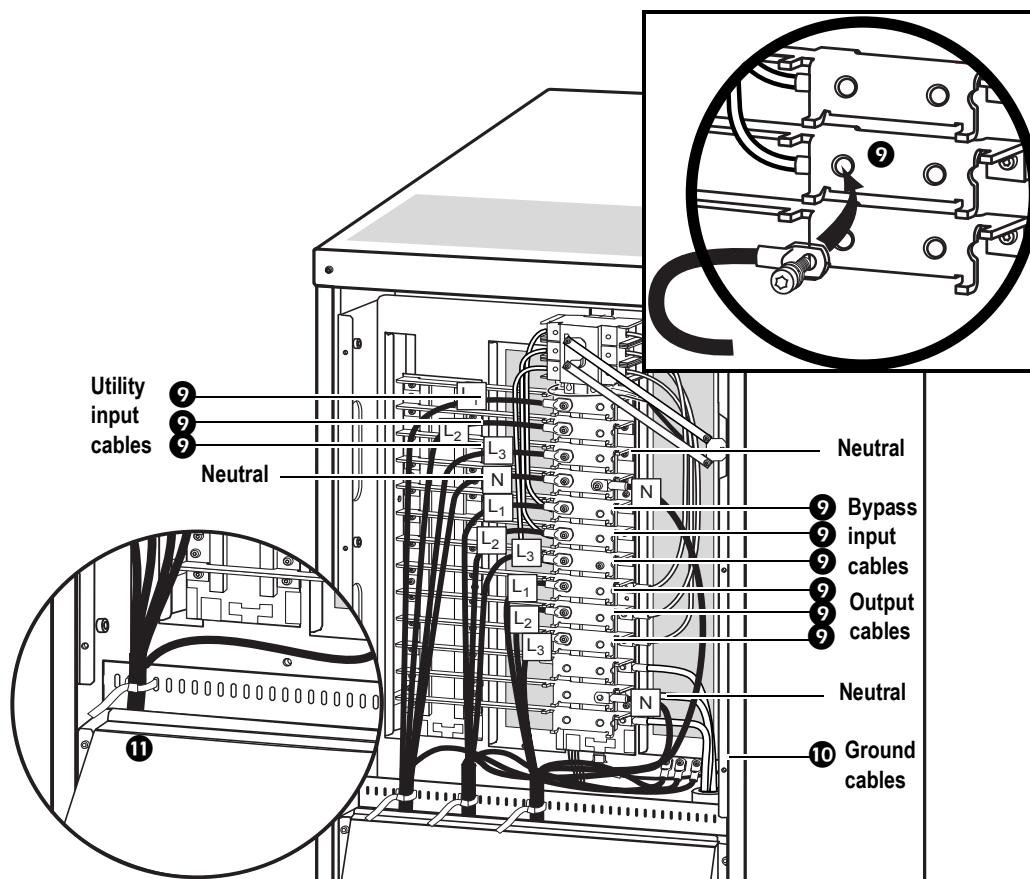
**Note** The illustrations show 20.59 in/523 mm Enclosures, but the installation procedures are identical for 13.85 in/352 mm Enclosures).

## Wiring procedure – dual mains



- ❶ Loosen the (6) M4 screws from the cover of the cable termination area, and remove.
- ❷ Loosen the (2) M4 screws (1 each side) from the top part of the Conduit Box. Loosen the M4 screws attaching it to the bottom part (2 screws in a 13.8 5in/352 mm Enclosure, 3 screws in a 20.59 in/523 mm Enclosure), and remove.
- ❸ Loosen the (4) M4 screws (2 each side) from the bottom part of the Conduit Box and remove.

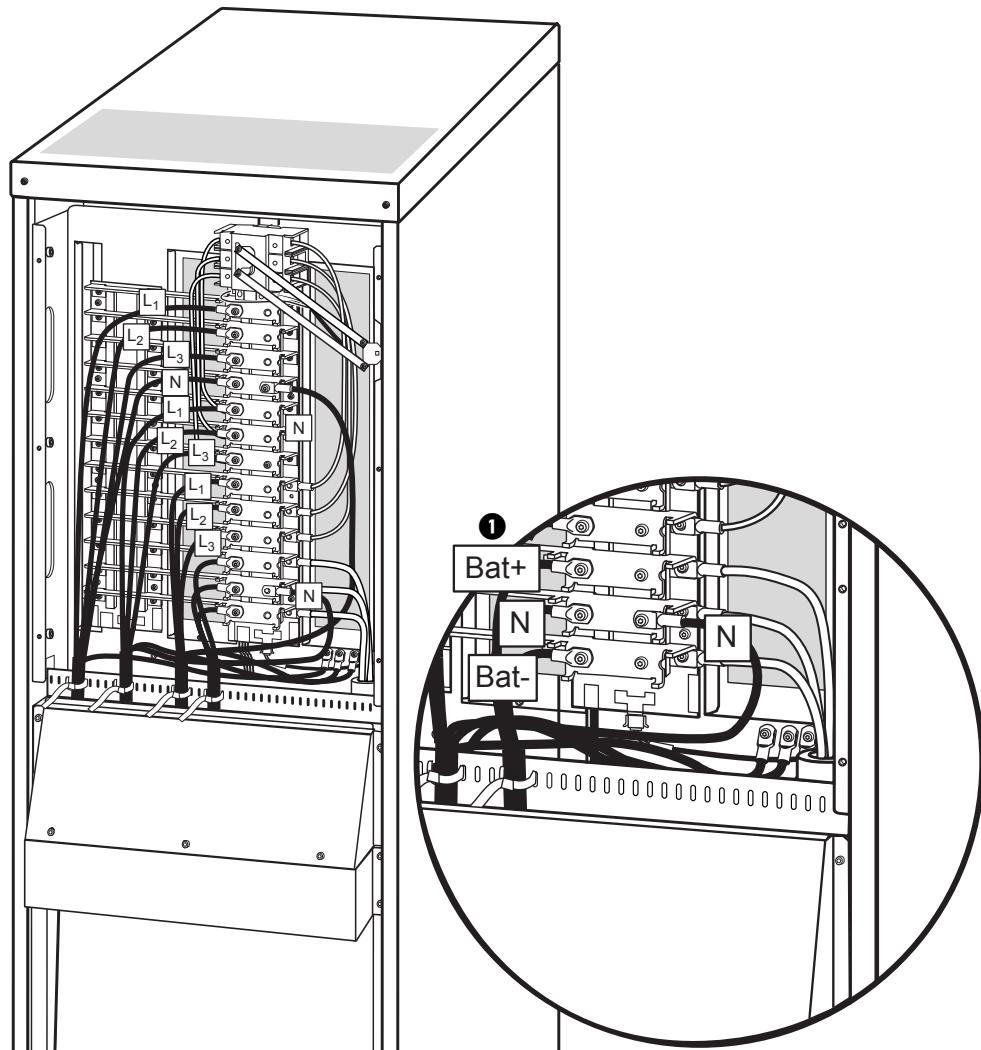
- ④ Punch 3 holes in the Conduit Box bottom to fit the size of the conduit pipes, and reattach the Conduit Box bottom to the Enclosure, re-using the (4) M4 screws.
- ⑤ Install conduit pipes in the Conduit Box bottom.
- ⑥ Run cables through the conduit pipes and the bottom of the Conduit Box. Guide the cables behind the bar and up into the input/output area.
- ⑦ Reinstall the top part of the Conduit Box to the Enclosure, following reverse deinstallation procedures (described in a previous step).
- ⑧ Remove the (2) M6 screws from Brackets A, B, and C and remove all 3 brackets.



- ⑨ Attach input cable lugs to L1, L2 and L3 input busbars (left side in the UPS – on the front of the busbar), using the provided M6 torx screws. Attach bypass cable lugs to L1, L2, L3 bypass busbars, using the provided torx screws. Attach output cable lugs to L1, L2, L3 output busbars, using the provided torx screws.  
Attach N x 3 where shown., using the provided torx screws.
- ⑩ Attach Ground x 3 where shown.
- ⑪ Fasten all cables with cable ties.
- ⑫ Reinstall rear cover.

# External Battery Wiring

## Wiring to battery bank or battery racks



- 1 Attach DC cables to upper part of busbars as shown.



For configurations including customer-supplied external batteries, refer to manufacturer's battery installation and maintenance instructions.

See also

# Communication Wiring to EPO and Optional Equipment

---



Note

EPO switch must be connected to a NEC Class 2 wiring.



Note

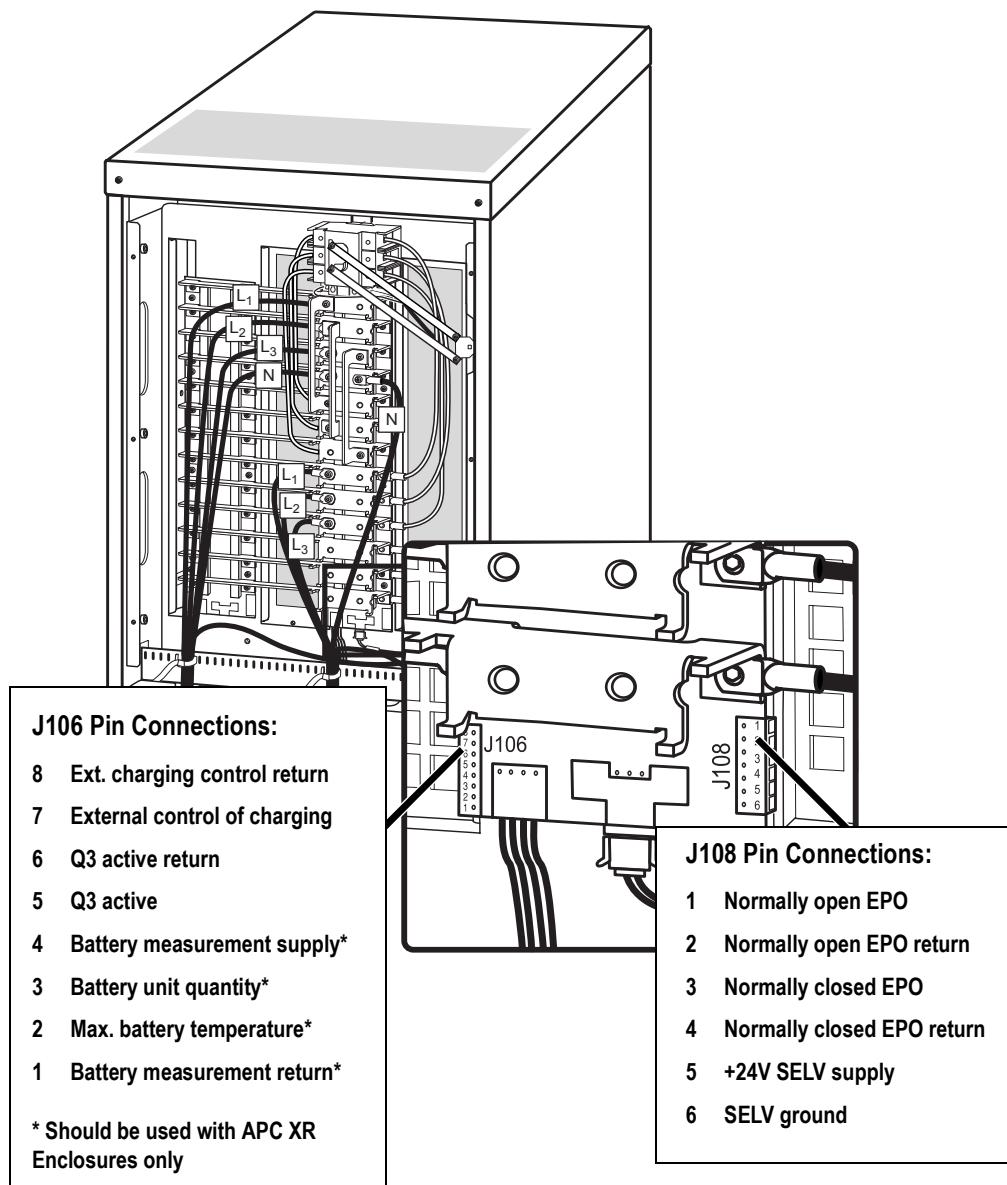
Use only 28-16AWG copper wire for the connection of the Emergency Power Off (EPO) and other optional equipment. Keep all other wiring and uninsulated live parts separate of other NEC Class 2 circuits.



Note

Do not connect any circuits to the EPO terminal block unless it can be confirmed that the circuit is a NEC Class 2 circuit.

### Pin connections J106 (XR Enclosure) and J108 (EPO)



### Pin connections J106 (UPS) to J200 (XR Enclosure - option)

Pins 1 through 4 are for battery measurement (only applicable to APC XR Enclosures).

Pins 5 & 6 are for external maintenance bypass Q3. When Q3 is closed, signals are fed back to the UPS controller.

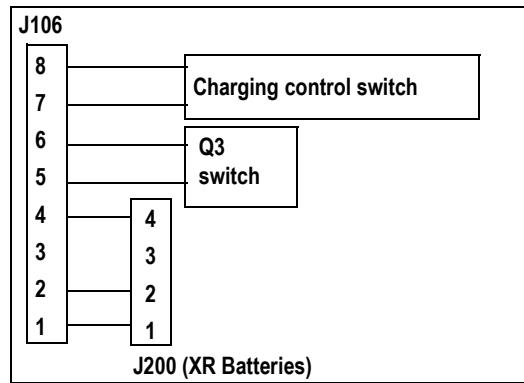
Pins 7 & 8 are for external charge control. When 7 & 8 are closed, the UPS charges batteries with a pre-defined percentage (0-100%) of the maximum charging power. To be used in generator applications, or if special codes requires control of charging.



When connecting the Q3 auxiliary signal, use gold-plated N/C auxiliary switch on Q3.

Note

### **XR Enclosure, APC Maintenance Bypass Panel, and Generator Control wiring**



Pins 1 through 4 are for battery measurement (only applicable to APC XR Enclosures).

Pins 5 through 6 are for external maintenance bypass Q3.

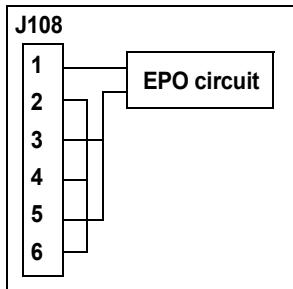
Pins 7 and 8 are for external charge control.

## Pin connections J108 (for EPO wiring options)

**EPO switch wiring.** The UPS must be connected to either a dry contact or a 24V<sub>DC</sub> Emergency Power Off (EPO) switch.

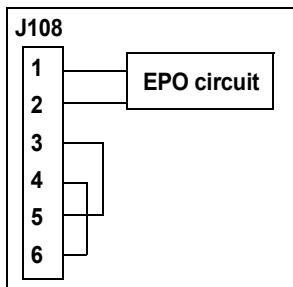
Connect the EPO cable, using one of the following 4 wiring configurations.

1: Dry Contracts  
Normally Open



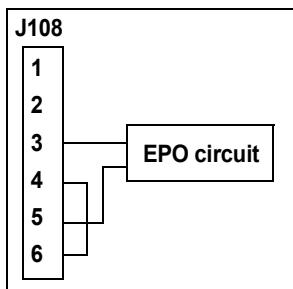
EPO is activated when pin 1 is connected to pins 3, and 5

2: +24V Normally Open



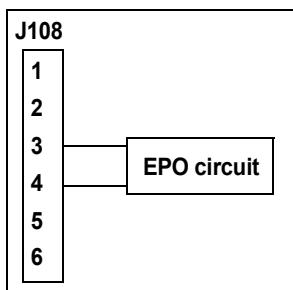
EPO is activated when an isolated SELV 24V<sub>DC</sub> voltage is supplied on pin 1 with reference to pin 2.

3: Dry Contacts  
Normally Closed



EPO is activated when a connection from pin 3 to pin 5 is opened

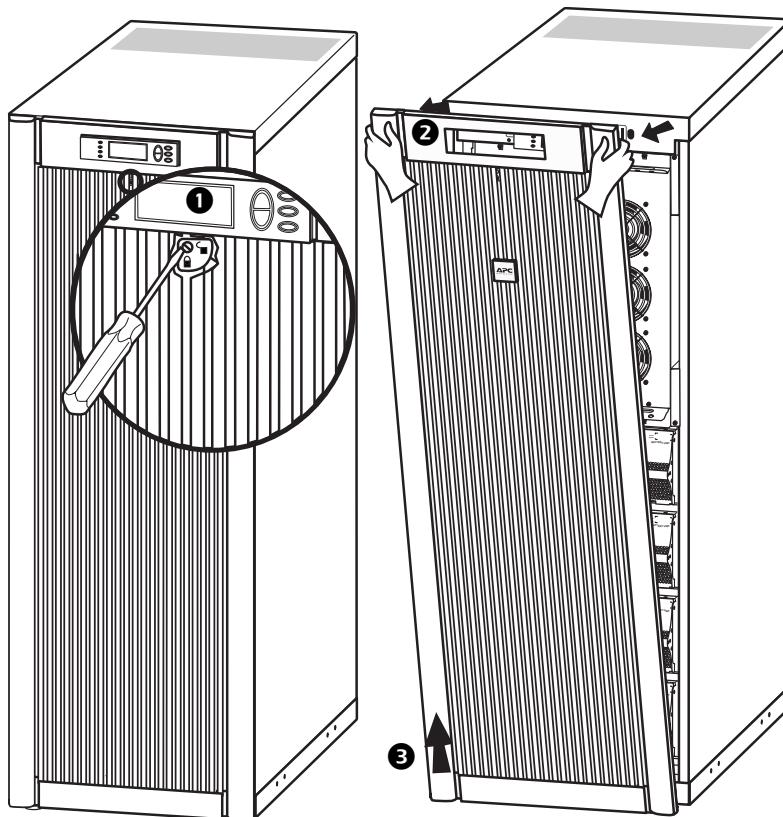
4: +24V Normally  
Closed



EPO is activated when a SELV 24V<sub>DC</sub> voltage removed from pin 3 with reference to pin 5

# Connection of APC Humidity Sensor

## Front panel removal

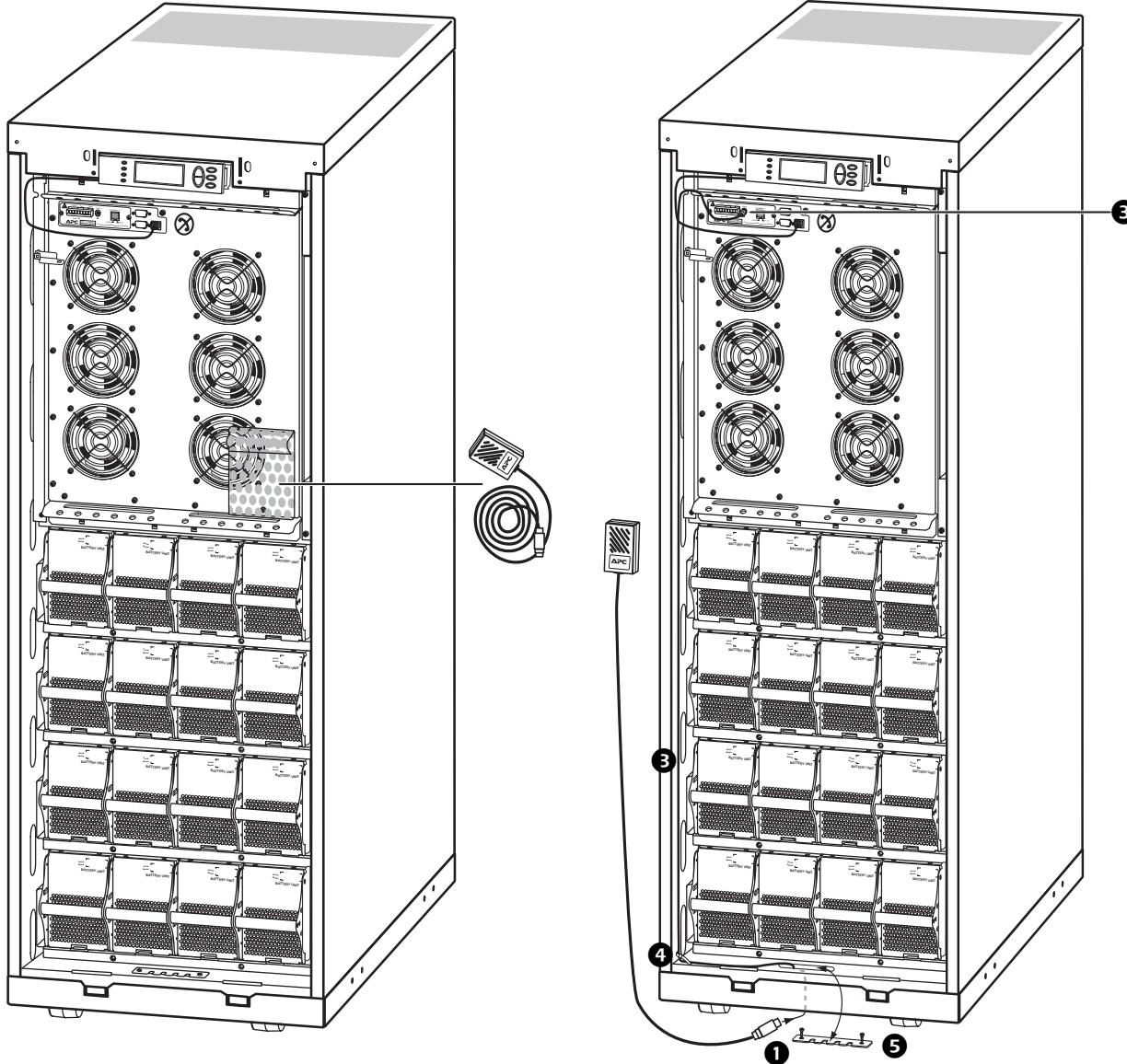


- ① To remove a Front Panel, turn screw clockwise to unlocked position.
- ② Pull top of Front Panel free of UPS.
- ③ Lift the Front Panel free of the two slots at the bottom of the Enclosure.



The Humidity Sensor is provided in a plastic bag attached to the front of the UPS.

Note



- ④ Remove the 2 screws from the cable inlet at the front – and remove cable-inlet plate.
- ⑤ Guide the cable through the hole in the bottom plate and up through the cable inlet.



See “*Foot print*” on page 8 to locate the communication cable inlet.

- ❶ Guide the cable up alongside the side panel and insert the Humidity Sensor plug into the socket marked “Probe”.
- ❷ Fasten the cable to the side panel with enclosed cable ties.
- ❸ Remount the cable-inlet plate.
- ❹ Place the Humidity Sensor where applicable.

# Wiring Verification Procedure

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Do not connect batteries in the UPS.

**Note**

Use following procedure to verify that the UPS has been wired properly:

- 1. If your installation includes an XR Enclosure, make sure that the DC breaker (if available) is in the OFF position and that both 125A fuses are removed from the XR Enclosure.
- 2. Check that the power wiring is torqued to 45 lbf·in/7Nm.
- 3. If your installation includes an XR Enclosure, remount the 125A fuses in the XR Enclosure and check that the DC breaker (if available) on the XR Battery Enclosure is in the ON position.
- 4. Please leave a wiring diagram on site for service / technical support personnel.



If a problem occurs, phone Customer Support at (1) (800) 800-4272 (US and Canada). Refer to rear cover for contact numbers in other countries.

**Note**



If you have purchased any optional equipment, refer to product-specific manuals.

**Note**



Start-up must be performed by APC authorized personnel only. Call APC to scedule a free 5x8 Start-up service.

# Installation Site Checklist

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This checklist should be completed by the electrician after the wiring has been completed:

Installed at (company name, date, contact) \_\_\_\_\_

Name and telephone number of electrician: \_\_\_\_\_

UPS serial number: \_\_\_\_\_

Input Circuit Breaker size and type: \_\_\_\_\_

Output fuse size and type: \_\_\_\_\_

Location of protection devices (room): \_\_\_\_\_

Breaker ID: \_\_\_\_\_

EPO type: \_\_\_\_\_

Wire size and type: \_\_\_\_\_

Ground connection method and location: \_\_\_\_\_



## APC Worldwide Customer Support

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to access documents in the APC Knowledge Base and to submit customer support requests.
  - [www.apc.com](http://www.apc.com) (Corporate Headquarters)  
Connect to localized APC Web sites for specific countries, each of which provides customer support information.
  - [www.apc.com/support/](http://www.apc.com/support/)  
Global support searching APC Knowledge Base and using e-support.
- Contact an APC Customer Support center by telephone or e-mail.
  - Regional centers:

Direct InfraStruXure Customer Support Line	(1)(877)537-0607 (toll free)
APC headquarters U.S., Canada	(1)(800)800-4272 (toll free)
Latin America	(1)(401)789-5735 (USA)
Europe, Middle East, Africa	(353)(91)702000 (Ireland)
Japan	(0) 35434-2021
Australia, New Zealand, South Pacific area	(61) (2) 9955 9366 (Australia)

- Local, country-specific centers: go to [www.apc.com/support/contact](http://www.apc.com/support/contact) for contact information.

Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

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